

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of claims:

1-34. (cancelled)

35. (new) An industrial process for recycling every type of waste, comprising:

- a) a physical preliminary treatment for waste volumetric reduction and compacting, so as to obtain a homogenous refined mixture free of ferrous/metal and/or too large residues;
- b) feeding said mixture deriving from step a) into a first chamber of a multistage reactor, in which the mixture undergoes an oxidative demolition-depolymerization process;
- c) feeding said oxidized mixture deriving from step b) into a solid-liquid extractor, in which the mixture is separated into its components, so as to obtain a biologically stable, sterile, fluid organic phase and a solid sterile dry phase;

or

- d) feeding said oxidized mixture deriving from step b) into a second chamber of said multistage reactor, in which the mixture is activated to a repolymerization process; and
- e) feeding said activated mixture deriving from step d) into a third chamber of said multistage reactor, in which said repolymerization develops, and then into suitable collection or conveying means, in which said repolymerization reaction is completed, so as to obtain a sterile stable expanded polymer;

wherein:

- the oxidative demolition-depolymerization reaction of step b) is carried out by intensively mixing the mixture from step a) with a super-oxidizing mixture in the presence of catalysts comprising a mixture of molecular sieves, kaolin, clay, sodium aluminum silicates;
- the repolymerization reaction of step d) is carried out by intensively mixing said oxidized mixture with a repolymerizing mixture, in the presence of catalysts.

36. (new) The process according to claim 35, in which said molecular sieves are metered from about 1% to about 4% by weight, with respect to the weight of waste entering the reactor.

37. (new) The process according to claim 35, in which said catalysts have the following composition in percentage by weight: 75% of molecular sieves, 10% of kaolin, 8% of clay, 7% of sodium aluminum silicate blue powder.

38. (new) The process according to claim 35, in which said super-oxidizing mixture is prepared by mixing two different oxidizing solutions, independently prepared in two turbo-electrophotolytic reactors, and comprises an amount of highly reactive oxidizing species, such as hydroxyl radicals ·OH, ozone O₃, sodium hypochlorite NaClO, peroxides.

39. (new) The process according to claim 38, in which the first one of said two oxidizing solutions is prepared by treatment in a turbo-electrophotolytic reactor of an acid mixture A) comprising: peroxides, acetic acid, citric acid, stabilizers.

40. (new) The process according to claim 39, in which said mixture A) has the following composition in percentage by weight: peroxides, 50-80%; acetic acid, 7-15%; citric acid, 5-13%; stabilizers, 1%.

41. (new) The process according to claim 38, in which the second one of said two oxidizing solutions is prepared by treatment in a turbo-electrophotolytic reactor of a mixture B) comprising an aqueous phase added with brine.

42. (new) The process according to claim 41, in which said brine contains NaCl in an amount of 5-10% by weight and is present in an amount of about 10-20% by weight with respect to the recycled aqueous phase.

43. (new) The process according to claim 35, in which said repolymerization mixture comprises:

- a mixture of diphenyl-methane-4,4'-diisocyanate and/or isomers and homologues thereof, containing about 25% to 35% of NCO groups; said mixture being dispersed into an isomeric mixture of xlenes;
- diazabicyclooctane (DABCO);
- additives, such as N,N-dimethyl-acetylamine or N,N-dimethyl-aminoethanol;
- catalysts, said catalysts comprising a mixture of molecular sieves, kaolin, clay, sodium aluminum silicates.

44. (new) The process according to claim 43, in which sodium aluminum silicate in blue powder is present in a concentration of 6.5 to 16.5% by weight.

45. (new) A system for carrying out the process described in claim 35 comprising at least:

- a first section, comprising one or more modules, connected one to the other, for crushing, compacting and homogenizing waste;
- a second section, comprising a single stage or multistage reactor, for submitting said refined waste coming from the first section to an oxidative demolition-depolymerization process followed or not by a subsequent repolymerization process.

46. (new) The system according to claim 45, in which said first section comprises means for breaking, eliminating metal residues, crushing, refining and compacting waste.

47. (new) The system according to claim 45, in which said second section comprises a multistage reactor including:

- a device for loading refined waste;
- a first chamber, in which the oxidative demolition-depolymerization process occurs;
- a second chamber, in which the repolymerization process is activated;
- a third chamber, in which the repolymerization process develops, during the transfer of the waste mixture towards the reactor discharge.

48. (new) The system according to claim 47, in which:

- said first chamber has a section shaped like a cylinder and a frustum of cone;
- said second chamber has a section shaped like a cylinder and a frustum of cone;
- said third chamber has a cylindrical section.

49. (new) The system according to claim 47, in which said chambers are connected in series one to the other and are provided with means for mixing and conveying the waste mass to be transformed, said mixing and conveying means comprising a shaft-free double blade rotary spiral, having the same profile as the reactor chambers.

50. (new) The system multistage reactor according to claim 47, in which said chambers also comprise means for metering, restoring, recovering and recycling reagents and catalysts.

51. (new) The system according to claim 45, in which said second section further comprises:

- tanks for storing reagents;
- a first turbo-electrophotolytic reactor and a second turbo-electrophotolytic reactor for producing on-site the super-oxidizing mixture;
- devices for controlling and managing the system.

52. (new) The system according to claim 51, wherein said first turbo-electrophotolytic reactor comprises the combination into one reactor body of:

- an electrolytic cell;
- a photolytic reactor.

53. (new) The system according to claim 52, wherein said first turbo-electrophotolytic reactor comprises a cylindrical body into which the following elements are inserted:

- on one side the UV lamps, housed in a transparent Teflon cylinder;
- on the other side the electrodes, wound as a spiral around said Teflon cylinder.

54. (new) The system according to claim 53, in which the fluid to be subjected to the combined electrochemical-photolytic treatment flows between the negative and positive electrodes while it is bombed at the same time by UV rays emitted by the lamps.